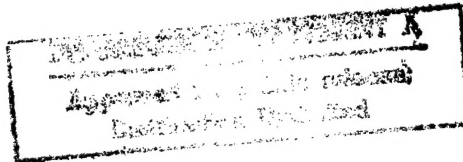


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9 November 1982



# USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 24



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## BIOCHEMISTRY

UDC 631.523/381.167

### PRODUCING BARLEY-RYE AND BARLEY-WHEAT HYBRIDS BASED ON CULTIVATED BARLEY VARIETIES

Kiev TSITOLOGIYA I GENETIKA in Russian Vol 16, No 3, May-Jun 82  
(manuscript received 17 Feb 81) pp 46-50

SHUMNYY, V. K., PERSHINA, L. A. and BELOVA, L. I., Institute of Cytology and Genetics, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] In an earlier article, the authors had reported on hybridization of wild barley and 2 varieties of rye (this journal, No 3, 1979). In the present study, they crossed 9 varieties of *H. vulgare* with 26 varieties of winter and spring *S. cereale* rye, and 7 barley varieties with 5 soft wheat types of *T. aestivum* and *T. timopheevi*. The crossed grain were grown on a Kruse medium. The number of fertile seeds was small. Those that grew varied in grain endosperm qualities and irregular germs. In crossing barley with wheat, the same barley varieties that produced successful hybrids with rye were again productive. Although setting of the hybrid barley-wheat combinations was much less, the grains were better filled and the germs more distinct. The barley-rye crossing also produced barley haploids. Of media tested, the Kruse medium with added amino acids was most effective. Figures 3; references 17: 3 Russian, 14 Western.  
[393-12131]

UDC 547.963.32.04

### SIMPLE METHOD FOR MULTIPLE 3'-PROXIMAL LABELING OF DNA FOR ITS SEQUENCING BY CHEMICAL MODIFICATION METHOD

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 4, Apr 82  
(manuscript received 2 Nov 81) pp 487-489

GUREVICH, A. I. and IGOSHIN, A. V., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Radioactive labeling of the 5'- or 3'-terminals of DNA represents a necessary stage in sequencing DNA by chemical modifications. To obtain clean radioautographs, it is imperative to achieve a sufficiently hot label

in the DNA fragments under analysis. This was achieved by using DNA polymerase of phase T4. This enzyme showed high 3'-exonuclease activity. Varying the ratio of T4 polymerase to the DNA fragment, the duration and temperature of the reaction, optimal conditions were found making it possible to introduce 3-10 labeled nucleotide residues into each DNA terminal. A 1 pmole solution of DNA in 100  $\mu$ l buffer containing 63 mM tris-HCl, 6.3 mM MgCl<sub>2</sub>, 10 mM 2-mercaptoethanol, 17 mM (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, pH 8.8 and 170 mg/ml of gelatin were treated with T4-DNA polymerase for 5 min at 37° C. The mixture was then treated with [ $\alpha$ -<sup>32</sup>P]dNTP and after 2 min with cold dNTP. The reaction mixture was then incubated for 10 min at 20°C, 15  $\mu$ l of 0.5 M EDTA, 15  $\mu$ l of 3 M sodium acetate were added at pH 5.5 and the labeled DNA was precipitated with 300  $\mu$ l alcohol. References 9: 5 Russian, 4 Western.  
[409-7813]

UDC 547.963.32.04

#### ISOLATION OF rrn B PROMOTERS OF ESCHERICHIA COLI

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 4, Apr 82  
(manuscript received 7 Dec 81) pp 557-560

GUREVICH, A. I., AVAKOV, A. E., IGOSHIN, A. V. and KOLOSOV, M. N., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Short restriction fragments were isolated from the initiation region of the operon rrnB and they were used as promoters in construction of functionally active synthetic genes. Recombinant plasmids pRRN2-pRRN4 were obtained carrying mono-, di- and pre-promoter fragments of the initiation region of the operon rrnB. Their nucleotide sequence was found to be exactly the same as that published by Csordas-Toth et al. Functional activity of these fragments, i. e., their effect on the expression of gene tet in recombinant plasmid was estimated qualitatively by the resistance of bacterial cells to tetracycline. In all cases EOP<sub>50</sub> value of the pRRN series plasmids was much higher than of the pBR322. The recombinant plasmid pRRN4 conferred upon E. coli a two-fold increase of resistance to tetracycline. This led the authors to the conclusion that insertion of the A-T rich fragment directly ahead of the promoter P<sub>tet</sub> doubled the transcription intensity. Figures 2; references 12: 4 Russian, 8 Western.  
[409-7813]

NUCLEOTIDE SEQUENCE OF PHASE  $\lambda$  DNA REGION CODING FOR GENE Q

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 8, No 4, Apr 82  
(manuscript received 31 Aug 81) pp 561-563

PETROV, N. A., SERPINSKIY, O. I., MIDRYUKOV, N. N., KARGINOV, V. A. and  
KRAVCHENKO, V. V., All-Union Scientific Research Institute of Molecular  
Biology, Novosibirsk

[Abstract] EcoRI+BamHI fragment of DNA phage  $\lambda$  containing gene Q and the transcription 6S RNA was cloned in pBR322 composition and its  $^{32}\text{P}$  labeled subfragments were used to elucidate the primary structure of gene Q and promoter  $p_R$ . The structure of this DNA fragment was found to be 750 base pairs long. At the beginning of this sequence a complementary fragment to 3'-terminal 16S pRNA was found five nucleotides away from the initiator AUG-codon. Translation of mRNA from this codon could yield a polypeptide with 207 amino acid residues and a molecular weight of 23114. According to electrophoretic analysis in polyacrylamide gel, the mobility of Q protein corresponds to a polypeptide with molecular weight 23000. According to the genetic chart of DNA phase  $\lambda$ , the promoter  $p_R$  follows gene Q. The complete nucleotide sequence of gene Q has been thus established. Figure 1; references 12: 4 Russian, 8 Western (1 by a Russian and 1 by Polish authors).  
[409-7813]

## BIOPHYSICS

### EFFECT OF ELECTRICAL PARAMETERS DISPERSION OF BACTERIAL CELLS ON THEIR ORIENTATION IN ALTERNATING ELECTRIC FIELD

Moscow BIOFIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 1 Jul 81, after correction 6 Oct 81) pp 665-669

FOMCHENKOV, V. M., MAZANOV, A. L. and BREZGUNOV, V. N., All-Union Scientific Research Institute of Applied Microbiology, Serpukhov

[Abstract] Using an electrophysical model of bacterial cells, the frequency of the orienting force momentum acting upon bacterial cells (approximated by a rotation ellipsoid) has been analyzed, with due consideration for the dispersion of their electric parameters. At frequencies below  $10^9$  Hz, two patterns of the dispersion of electric parameters were observed:  $\alpha$  pattern connected with the relaxation of the polarization of the double electric layer, and pattern relating to the structural polarization of the cell. The relative value of the momentum as a function of electric and geometrical parameters was calculated. It was noted that as the electroconductivity of the external medium increased, the effective conductivity of the cell remaining constant, a marked decrease of the value of the momentum was observed only at the low and medium frequencies. At high frequencies, there was practically no change. It was concluded that at low and medium frequencies the electroorientation of bacterial cells, expressed as a function of the frequency, is related to frequency dispersion of the effective electric cell parameters. Figures 4; references 15: 6 Russian, 9 Western (1 by a Russian author).  
[433-7813]

### MODEL FOR RESTORATION OF CELLULAR COMPOSITION OF RED BLOOD

Moscow BIOGIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 18 Jun 81) pp 694-697

YEGARMIN, V. Ye., Institute of Molecular Biology, USSR Academy of Sciences, Moscow

[Abstract] Cellular blood composition and blood-forming organs in a healthy organism are in a dynamic equilibrium. Loss of blood stimulates restorative processes. In the present paper, changes in blood cell population have been

addressed: changes in erythrocytes and reticulocytes resulting from deviations from a normal state. Regulation of blood cell numbers is related to their principal function in any organism, i.e., oxygen transport in the tissue. In response to hypoxia, erythropoiesis is stimulated by a humoral factor - erythropoietin; in contrast, transfusion of blood cells retards erythrocyte production. A basic assumption is made that influx of new cells into the blood stream is in reverse relationship to the number of cells in blood. On this basis a model was developed for the restoration of normal red cell equilibrium after blood loss, maintaining cell hemolysis rate constant. Maximum deviations in this system increased with increasing blood loss. In general, it was shown that the model describing the changes during chronic blood loss exhibited an autooscillative pattern. This pattern resembled the oscillations observed during injection of antibodies leading to destruction of erythrocytes. Figures 2; references 12: 6 Russian, 6 Western.  
[433-7813]

#### FOOT ELASTICITY IN MODELLING OF HUMAN MOVEMENTS

Moscow BIOFIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 7 Jul 81, after completion 17 Nov 81) pp 711-714

ZINKOVSKIY, A. V. and CHESTYAKOV, V. A., Leningrad Polytechnical Institute

[Abstract] A novel mathematical model was proposed for the estimation of the elasticity of human foot movements. It is based on the anthropomorphic mechanism which was approximated by a system of rigid rods connected with ideal hinges. In this model the foot is represented as an elastic rod on an absolutely rigid base. This assumption made it possible to use the theory of flexing and cross vibrations of elastic rods in studying the dynamics of the foot. On the basis of this model, the movement of an athlete performing a jump was calculated and found to be in a much better agreement with the experimental data than was possible to achieve with a model based on a solid rod. Figures 2; references 9 Russian.  
[433-7813]

#### REGULATION OF HUMAN BALANCE ON SMALL SUPPORT SURFACE

Moscow BIOFIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 16 Sep 81) pp 734-735

PETRENKO, Ye. T., Kazakh Institute of Physical Education, Alma-Ata

[Abstract] The biomechanisms of the regulation of human bodily equilibrium on normal and decreased support surfaces have been studied adequately. The regulation of the equilibrium is a cyclically oscillating correction process of the body's common weight center (CWC) in a system of variable rigidity. Regulation of the equilibrium on small support surfaces may be different from these processes encountered in normal human situations. For this reason

correlation-spectral characteristics of a series of processes involved in regulating human equilibrium on small support surfaces were studied on 15 "Master of Sport" athletes who kept their balance on the entire foot or on the toes only. During the exercise, following determinations were made: stabilograms, microshifts of the CWC of the body, electrogoniograms of the angular shifts at the knee and ankle and electromyograms of the shin muscles on the leg being tested. These measurements were converted to spectral functions. Achievement of balance on the foot corresponded to autospectrogram signals in the range of 0.2-1 Hz. When balance on toes was achieved, the dominant band was in the frequency range of 3-6 Hz. The data showed that balance regulation processes are intensified under extreme conditions. Maintenance of balance on toes is possible only after considerable training. Figure 1; references 4: 2 Russian, 2 Western.

[433-7813]



## GENETICS

UDC 575.17

### INVESTIGATION OF GENETIC BASIS FOR INDIVIDUALITY IN HUMAN POPULATIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 2, Jul 82  
(manuscript received 1 Feb 82) pp 470-473

DUBININ, N. P., academician, and BULAYEVA, K. B., Institute of General Genetics,  
USSR Academy of Sciences, Moscow

[Abstract] Among many human populations the most original ones are the isolates which, because of their endogamy and inbreeding, form unique characteristics of genetic and social structures. These characteristics may be reflected to some degree in the dynamic aspects of their behavior and in higher nervous activity. Two such isolates from Dagestan were studied using selected and random representatives from the villages of Botlikh and Muni. A heterogenetic population from Moscow was used as the control. Three age groups comprised the study population: 15-16, 19-25 and 35-55 years of age. The principal study group consisted of 15-16 years old teenagers, their older siblings and their parents. The study included determinations of the reaction time to light and sound stimuli, rate of motor activity, lability of nervous system, slope of the reaction time curve to various stimuli, reception of green and yellow light, etc. It was shown that practically all behavioral parameters exhibited some degree of heterogeneity. The mutational and hereditary parameters of neuro- and psycho-dynamic organization levels of all populations studied exhibited inverse tendencies. There were interpopulation differences. The phenotypic and genetic correlations of neurodynamic parameters showed greater similarities in both isolates than the psychodynamic parameters. Each isolate exhibited a characteristic system of phenotypic and genetic correlations reflecting the originality of their genetic and social structures. Figures 2; references 11 (Russian).

[412-7813]

GENE LOCATION IN POLYCISTRONIC mRNA BY OLIGONUCLEOTIDE PROBING METHOD USING  
BARLEY STRIPE MOSAIC VIRUS MEMBRANE PROTEIN GENE AS EXAMPLE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 2, Jun 82  
(manuscript received 8 Feb 82) pp 474-477

DOLYA, V. V., LUNINA, N. A., SMIRNOV, V. D., KARPOV, V. A., KHUDYAKOV, Yu. Ye.,  
KOZLOV, Yu. V., BAYEV, A. A., ac demician, and ATABEKOV, I. G., Moscow State  
University imeni M. V. Lomonosov

[Abstract] Accurate localization of the membrane protein gene on RNA 2 of the di- and tri-component Barley stripe mosaic virus (BSMV) was attempted along with the investigation of the structure of 5'-terminal region of RNA 2. The experimental procedure involved: a) sequencing the N-terminal fragment of the BSMV membrane protein, b) selection of a short sequence of nucleotides (9 residues) coding for the aminoacids in the protein and c) synthesis of oligodesoxyribonucleotide followed by targeted cut of the RNA by means of RNAase H E. coli. It was shown earlier that the RNAase H cuts specifically high molecular RNA in presence of oligodesoxyribonucleotides complement to the fragment selected. Two approaches were taken: 1) directed slicing of RNA and 2) reverse transcription of the RNA 2 fragment. Both methods for the localization of membrane protein gene gave identical results for the di-component strain Norwich II and the tri-component Norwich III RNA 2. The work on exact identification of the 5'-terminal of BSMV R A is continuing, since the method used in this study could not accurately identify the molecules at the far end of the 5'-segment. Figures 2; references 9: 1 Russian, 8 Western (4 by Russian authors).  
[412-7813]

STIMULATING EFFECT OF VARIOLA-VACCINE VIRUS ON REPAIR PARAMETERS OF DNA DAMAGED  
BY 4-NITROQUINOLINE-1-OXIDE (4-NQO)

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 2, Jul 82  
(manuscript received 12 Feb 82) pp 485-487

SINEL'SHCHIKOVA, T. A., VIKHANSKAYA, F. L., ZASUKHINA, G. D. and  
ZHESTYANIKOV, V. D., Institute of General Genetics, USSR Academy of  
Sciences, Moscow; and Institute of Cytology, USSR Academy of Sciences,  
Leningrad

[Abstract] Two approaches were used in searching for possible stimulating effect of variola-vaccine virus allowing the determination of the activity of excisional reparation, which represented the process of reunion of DNA fragments and postreplication reparation which characterized DNA synthesis on a damaged matrix. The experiments were performed on an asynchronous cell

culture of Chinese hamster V-79. The processes of pre- and post-replication reparation were studied by a general method using centrifugated cell lysates in alkaline saccharose gradients. A two hour postincubation resulted in restoration of the 4-NQO breaks in DNA. It was concluded that the synthesis of high molecular DNA on 4-NQO damaged matrix is more rapid in the cells infected with variola-vaccine virus than in the noninfected controls. The restoration of the damage induced by the excision route was also more effective. Stimulation of pre- and post-replication in mammalian cells could lead to increased resistance of the cells to mutagenic action. Figures 2; references 13: 6 Russian, 7 Western (1 by a Russian author).  
[412-7813]

## IMMUNOLOGY

UDC 616.98:578.832.1]-022.14:616.98:579.861.2]-07.616.155.3-097.3-078.73

### IMMUNE RESPONSE TO MIXED INFLUENZA-STAPHYLOCOCCAL INFECTION IN MICE

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 82 (manuscript received 24 Nov 81)  
pp 46-49

MIRZAYANTS, G. Kh., BELOTSKIY, S. M. and CHISTYAKOVA, I. V., Scientific Research Institute of Virology and Epidemiology imeni I. I. Mechnikov, Odessa; Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] In recent years the incidence of mixed viral-bacterial infections has become of great concern in human disease control. The authors studied the reaction of phagocytes, T- and V-lymphocytes and their sub-populations in response to experimental influenza-staphylococcal infections, administered to 60 SVA mice intranasally. The course of the illness generally brought death 5 days sooner than the influenza virus alone, but the mixed infection was less lethal for the overall group (only 30% died compared to 56% for the control group). Immunological observations showed that neutrophil functional activity was suppressed by the mixed infection. Phagocyte function was impaired and this factor was combined with reduction of T- and V-cells and their activated sub-populations at early stages after infection. The data point indirectly to T-dependency of immune response in mice with the mixed infection. Figures 2, references 9: 6 Russian, 3 Western.  
[399-12131]

UDC 612.017.1-06:579.222:547.458]:612.6.05

### GENETIC CONTROL OF IMMUNOLOGICAL TOLERANCE TO BACTERIAL POLYSACCHARIDES

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 82 (manuscript received 1 Oct 81)  
pp 63-67

FROLOV, A. F. and BORISOV, V. A., Scientific Research Institute of Infectious Diseases, UkSSR Ministry of Health, Kiev

[Abstract] The role of genes in immune responses has recently been shown. The authors studied inherited sensitivity and resistance in mice to Salmonella typhosa Vi-antigen and the lipopolysaccharide Shigella sonnei. The bacteria

were injected into various inbred lines and hybrids. Immunological tolerance to the Vi-antigen was developed by light doses, followed 1 and 4 weeks later by 10 mcg doses; a similar procedure was used with the lipopolysaccharide (LPS). Statistical processing of the results to determine average geometric antibody titers indicated clear variations between strains of test mice. Initial administration of 2 mg of Vi-antigen did not lead to antibody production in all but one strain, but later 0.5 mg doses were effective. Statistical results with LPS were similar, but the data were not reliable. Results indicated that immunological tolerance to bacterial polysaccharides is controlled by numerous dominant and recessive genes that are probably located on different chromosomes. Figures 2; references 15: 10 Russian, 5 Western.  
[399-12131]

UDC 612.017.1

#### ENDORPHIN-LIKE PROPERTIES OF BONE MARROW STIMULATOR OF ANTIBODY PRODUCERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 2, Jul 82  
(manuscript received 11 Mar 82) pp 501-503

PETROV, R. V., full member of the USSR Academy of Medical Sciences, DURINYAN, R. A., VASILENKO, A. M., RESHETNYAK, V. K., MIKHAYLOVA, A. A., ZAKHAROVA, L. A., BRAGIN, Ye. O. and KUKUSHKIN, M. L., Central Scientific Research Institute of Reflexotherapy, Institute of Biophysics, Moscow

[Abstract] Stimulation of antibody producers (SAP) are mediators of the bone marrow's regulatory function in immunological response. In this study it was shown that they also possess endorphine-like activity. The effect of SAP on pain sensitivity of experimental animals was studied on two models: a neurophysiological one and on a behavioral model. The experimental results showed that SAP influenced both the electrophysiological and the behavioral reactions of animals to somatosensory stimuli. SAP exhibited its effect primarily in the frontal zone of the cortex, in contrast to morphine type analgesics, which are manifested in the second somatosensory region. It could be assumed that SAP is not only a mediator regulating production of antibodies but also serves as a transmitter of information from the immunologic to the central nervous system. Figures 2; references 4: 2 Russian, 2 Western.  
[412-7813]

## MEDICINE

UDC: 616-006.04-084-07

### PREVENTION OF MALIGNANT NEOPLASMS BASED ON EPIDEMIOLOGICAL INVESTIGATIONS

Leningrad VOPROSY ONKOLOGII in Russian Vol 28, No 5, May 82 (manuscript received 11 Jan 82) pp 133-141

[Lecture by A. V. Chaklin, All-Union Oncological Research Center, USSR Academy of Medical Sciences]

[Text] The ultimate goal of epidemiological studies of malignant tumors is to obtain new facts on etiology of cancer, develop optimum programs of organizing cancer control work and, first of all, individual and State measures to prevent malignant tumors.

Thirty years of studies of epidemiology of malignant tumors in the USSR and abroad have shown that there is nonuniform distribution of different forms of tumors in different populations. As a result of descriptive and analytical studies, determination has been made of some patterns in the incidence of cancer of the esophagus, stomach, breast, etc., in different ethnic, industrial and other population groups; determination has been made of regions of high morbidity and those where there are relatively few recorded cases of malignant tumors of some localizations. If the causes of these differences are elicited and factors identified that determine relatively high and relatively low morbidity, it could be possible to work out a number of problems of etiology of these diseases; detection of high risk groups for malignant diseases and development of regional prevention programs constitute the most important tasks at the present stage of development of epidemiology of malignant tumors.

Thanks to the studies of epidemiologists and experimenters, it has been shown that of all factors responsible for malignant tumors, poor diet and nutrition constitute up to 35%, smoking up to 30%, infection and chronic parasitic diseases up to 10%, industrial factors up to 4%, geographic factors up to 3% and alcohol use 3%. There is no doubt that one cannot examine each of these factors apart from an individual's life-style, effects on him of industrial and household factors, complex aggregate thereof.

The search for the causes of malignant tumors in man, which was begun spontaneously to some extent, gradually acquired specific directions; it was important to determine the extent of causative determination of different types of malignant neoplasms and to take comprehensively into consideration the entire diversity of links between the human body and the environment.

While we do have some rather convincing experimental evidence that the so-called occupational factor is a cause of cancer, it is much more complicated to obtain proof concerning the so-called general [everyday, household?] forms of cancer, let alone those that seemingly were unrelated to either an occupational or general factor. Only 4% of the cancer cases are related to the effect of occupations, which means that 96% have other causes. Effective primary cancer prevention can be achieved only when we learn about man's living conditions, assess the effects on him of environmental factors.

Studies of recent years have shown that 2 to 7 years elapse from the time the first tumor cell appears to clinical manifestations thereof, and we can actually refer to the "iceberg phenomenon." The exposed part thereof is the record of morbidity in a given year, whereas the part that is concealed from us is the undetected and unrecorded morbidity, which makes up, so to speak, the underwater part of the iceberg.

The question arises as to how to detect and keep records of individuals who have some processes that lead to clinically demonstrable stages of malignant tumors. Refined cytological and immunological techniques can definitely aid in detecting this group of individuals; however, a method has also been developed and tested of picking up high risk groups on the basis of retrospective studies using computers. If these groups are sought by means of cytological, morphological, endoscopic, immunological and other laboratory tests, we can not only detect diseases at an early stage, but determine the conditions for primary prevention of malignant tumors.

At the present time, there are grounds to discuss "epidemiological diagnostics," which could, combined with clinical laboratory methods, yield a fuller idea about the real incidence of different forms of malignant tumors and this, in turn, would make it possible to expound and test hypotheses concerning the origin of different forms of malignant tumors using epidemiological and experimental studies.

In a speech at an aktiv of public health workers in 1981, USSR Health Minister S. P. Burenkov stated: "At the present stage, we have the conditions for introducing to public health practice some elements of primary prophylaxis, first of all to prevent cardiovascular and other widespread noninfectious diseases."

Oncologist-epidemiologists are also making their contribution to the development of primary cancer prevention. There is no need to enumerate the studies that yielded new data on the role of different conditions in development of neoplastic growth, but there is no longer any question of the fact that the difficult problem of cancer can be solved only on the basis of a combined [complex, multidisciplinary] approach.

With reference to factors that cause cancer, we have in mind primarily the 21 carcinogenic compounds known to date that are hazardous to man. There are real possibilities of controlling, precluding or lowering to a minimum their effect on man when he is working.

Is it necessary to continue the debate as to the percentage of malignant tumors related to environmental effects? After all, under all circumstances,

throughout man's lifetime he is exposed to the combined effect of exogenous and endogenous factors.

The presence of endogenous carcinogens that induce malignant tumors in experimental animals under certain conditions raises the question whether these compounds could be detected not only in cancer patients, but healthy elderly individuals who do not have cancer. Bile acids, sex hormones, cholesterol and hydroxylamines, which appear in the body as a result of metabolism of some protein components--this is far from a complete list of compounds that are potentially dangerous under certain conditions. Another means of cancer prevention is to find these conditions and determine how to reduce to a minimum the effects of endogenous carcinogens on man, and epidemiological studies could be effective, particularly with the use of laboratory methods. Thus, for example, in the presence of urine retention, tryptophan metabolites could affect the mucosa of the bladder and cause neoplastic growth. Assay of tryptophan and its metabolites in urine of certain population groups and formation of so-called "high risk groups" is an element of epidemiological studies of bladder cancer. Assay of sex hormones in the study of epidemiology of breast cancer in different ethnic groups is another example of this direction.

An important aspect of the search for means of preventing cancer is to determine the causes of absence of development of tumors under the influence of carcinogenic compounds in some experimental animals, so-called nullers. This occurs in large groups of people who smoke much and for a long time, but nevertheless do not develop lung cancer. They too are sort of nullers.

Most people also fail to get sick in populations with a high risk of liver cancer under the effect of aflatoxins or opisthorchosis, bladder cancer in regions of schistosomiasis, stomach cancer in areas where there are high concentrations of nitrates and nitrites in soil and water. What are the conditions that are instrumental in preventing malignant tumors in these people? This can only be answered by epidemiological studies, combined with evaluation of a number of parameters characterizing general health status and, in particular, immunocompetence of the organism.

Investigation of the geography of health includes an entire set of studies of adaptive capabilities of an individual and population. The choice of control groups is also a sort of choice of nullers.

At the present time, the study of populations with low morbidity referable to malignant tumors should play a large part for in-depth investigation of the possibilities of preventing cancer. As a rule, more attention in experimental studies is given to high-risk populations, where the causes of high morbidity are sought, yet the search for causes of low morbidity is just as important. One of the examples is referable to 7th Day Adventists, an evangelical sect numbering over 3 million people in the United States and other countries. They do not smoke, do not drink alcoholic beverages, do not use hot sauces or spices. Over half of them are vegetarians. They eat many fruit, vegetables, grains and nuts. This sect has been in existence for over 100 years, and its traditions are handed down from generation to generation. A study of 47,000 Adventists in the United States (California) revealed that there was a very low incidence of lung and breast cancer. Death rates referable to cancer of



the large intestines, stomach and thyroid constituted 60-70% of overall indicators for the United States. This also applies to more than 6 million Mormons. Their religion forbids the use of tobacco, alcohol, coffee, tea and drugs, and attributes much importance to a healthy life-style. In this group, mortality due to cancer constitutes 16% for males and 81% for females, as compared to the white population of the United States. Deaths due to cancer among 13,880 Mormon elders constituted 50% of the mortality among the white population of the United States. In the United States, as in the USSR, there is a certain pattern of decline in incidence of most forms of cancer from the north to the south.

Can we refer to a certain life-style that would be instrumental in a relatively low incidence of malignant tumors? Of course, we can. And we can cite as an example, the ethnic groups that do not smoke, drink alcoholic beverages, have abortions, do not refuse to nurse their infants, etc. Thus, a situation may develop where there are regions in the world inhabited by certain ethnic groups, among whom the risk of malignant tumors could be relatively low. In the Karshi Oblast\* of Uzbek SSR such conditions have apparently developed. When we tried to determine the causes, we became convinced that the number of smokers among the inhabitants of this region is considerably smaller than in a control region (Lithuanian SSR and Transcarpathia). According to the data of an expedition of the USSR Academy of Medical Sciences, it constituted no more than 63%, as compared to control regions. Part of the inhabitants, particularly among the elderly, take "nas," but if we compare the ingredients of "nas" used in Karshi Oblast to that used in Bukhara and Samarkand, we find that the concentration of lime is much lower. Accordingly, the incidence of cancer of the mouth is 30% lower.

The nature of diet, its regularity, intake of vitamins, as well as very low concentrations of nitrates and nitrites in soil and drinking water--these are the conditions that apparently were involved in the relatively low incidence of cancer of the stomach. Breast cancer is also extremely rare in Karshi Oblast. Families with many children, duration of breast feeding, scarcity of abortions, intercourse without contraceptives, when women are given male sex hormones--all this distinguishes this population group from women living in Lithuanian SSR, L'vov Oblast of Ukrainian SSR and Transcarpathia. Skin pigmentation of the local inhabitants is not of the least significance in the relatively low incidence of skin cancer. All of the foregoing creates conditions, under which the incidence of malignant tumors in Karshi Oblast is relatively low (up to 60 per 100,000 population), and this is actually the lowest indicator in the USSR.

Prevention of premature aging is definitely also an important protection against cancer, since the measures related to normalization of life-style largely coincide with those for cancer prevention. In the opinion of many researchers one can prevent development of a number of tumors by treating aging mechanisms. This applies in particular to endocrine-dependent tumors. There are quite a few reports about regions where life expectancy is long, where there are quite a lot of people 100 or more years of age. We refer to the Chanza ethnic group

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\*Translator's note: the author refers to "Karshi Oblast," although the gazetteer shows that this is Karshinskiy Rayon in Kashka-Darya Oblast.

in West Pakistan, residents of the Vilcabama area in Ecuador, some mountain regions of Georgia and Azerbaijan and others. In-depth analysis of these populations and determination of whether indeed cancer is relatively rare among them is another objective of oncoepidemiological studies. In assessing the data for the USSR, we became convinced of the fact that the incidence of malignant tumors is relatively low in regions where life expectancy is long. But what is involved in this? Only special in-depth studies can provide an answer to this question.

We find certain patterns in assessing the peak ages for different types of malignant tumors. In some regions, the highest incidence of some forms of cancer is recorded at a relatively younger age and, on the contrary, there are populations in which peak morbidity is referable to a later age. Another task for epidemiological studies is to investigate these groups and determine the causes of these differences.

Investigation of migratory people who move to new territories is one of the means of proving the role of genetic or ethnic factors in a differentiated evaluation of the role of endogenous and exogenous effects. Evaluation of the role of the micro- and macro-environment is also important. And, while we can refer to the former distinctions referable to diet, occupation, customs and habits, including smoking, the latter are referable to geographic conditions, with which we should include not only climate, but distinctions of water, soil and, to some extent, the environment in which a person works.

Monitoring conditions characterizing the environment, referring to atmosphere, air, soil, etc., is very important to epidemiological studies. But, over what period of time? For, if we know that the so-called "incubation" period varies considerably for different types of tumors, how much exposure time is required to cause neoplastic growth? This leads to the question of whether we can refer to the scale of the exposure period for different forms of cancer, not only with different localizations but certain histological forms. This period may vary in different climate and geographic regions; it could depend on hormone balance, age and other conditions.

At the present time, no one disputes the blastomogenic effect of radiations (radioactive substances, x- and ultraviolet rays). It is hardly necessary to prove the importance of studies in this direction. Nor can we underestimate the role of cosmic influences, in particular, solar activity and effect of ultraviolet radiation. As we know, there is a cycle to solar activity, and every 11 years there is a period of maximum activity with increase in dose of ultraviolet rays to which man is exposed. What happens 2-3 or 10 years after the year that the sun was "active"? It was noted that, with each year after this there is a rise in incidence of skin cancer in the exposed parts of the body, mainly the face and hands among people with minimal skin pigmentation.

Penetration of carcinogenic substances in the human body is merely the first step toward the danger of getting cancer. Resistance of the body, its genetic potential and metabolic distinctions--all this determines the possibility of a tumor. Investigation of the metabolic distinctions not only of separate individuals, but certain populations could open a new page in cancer prevention. We are referring to development of so-called "metabolic epidemiology."

Dyes and hormones in food, estrogens used in the menopause, hair dyes, certain pharmacological agents taken without medical supervision, etc., are among the factors that have been related to malignant tumors. There is a realistic possibility of monitoring their effects on man, but first of all there must be proof of the degree of their hazard, and this is aided by both experimental and epidemiological studies.

It should be borne in mind that it is not always by far that cancer develops in tissues exposed to carcinogens or modifying factors and, while the mechanisms of development of these forms of cancer can be observed under experimental conditions, this presents considerable difficulties in relation to man.

We know the role of aflatoxin in development of cancer. But it is still not clear how toxins produced by other fungi act. Groundnuts, which are used as food by the inhabitants of some regions of Africa, are often contaminated with mycotoxins. As a result, the incidence of undifferentiated hepatoma is high. It would appear that it is obvious what must be done to prevent this, but the habits of some national groups are often stronger than logic, and it is sometimes extremely difficult to fight against bad habits.

The nonsmoking group is of special interest; indeed the indicators of morbidity referable to the forms of malignant tumors related to this bad habit are low extremely for this group. If we consider a population of 100 million smoking males in industrial countries (data referable to Great Britain and the United States), there will be up to 60,000 cases of lung cancer annually among them, versus only 2500 among nonsmokers.

If we arbitrarily take a group of 20,000 people working in the asbestos industry, there will be 270 cases of lung cancer in the group of smokers and only 2 among nonsmokers. Such are the results of hypothetical predictions, which give us grounds to refer to an alternative prognosis if one or several factors are excluded. In this manner, we can achieve a decline in morbidity by eliminating some risk factors.

The concept of "problem of socially acceptable risk" has appeared. This refers to extrapolation of data obtained in experimental studies to man. Can one allow a socially acceptable risk? After all, it is one matter when the risk is calculated for a population and another matter when there is individual risk, which is calculated and, moreover, known. When dealing with industrial factors, no risk can be acceptable.

There is also another aspect, the personal risk in cases of alcoholism, smoking and improper life-style. Here there are many examples. But, unfortunately none of these examples has yet yielded the desired effect with regard to influencing people's consciousness. Another possibility emerges here: to search for new methods and upgrade existing ones of campaigning against cancer, with due consideration of psychological, ethical and many other conditions. In addition to alcoholism and smoking, we could discuss the significance of diet. It has been observed that obesity, overeating are instrumental in increasing the incidence of cancer of the large intestine, body of the uterus and breast. It is assumed that if smoking were ruled out one could lower mortality due to

cancer by 20-26%, and if we were to rule out the possibility of effects of carcinogens known to man, as well as smoking, intake of alcohol, excessive exposure to the sun and work in certain industries without proper labor safety, it could be lowered by another 33%. Thus, with the knowledge we now have, we could really lower morbidity referable to malignant tumors by over 50%. Thus, individual prevention could be the result of a normal [good] life-style. In this regard, abstaining from harmful habits and customs when people become convinced of their harm is of great importance in this plan.

Combined retrospective and prospective epidemiological studies open up vast possibilities for development of primary prevention of malignant tumors. It is also impossible to make prognoses and check them without epidemiological studies, and we are referring to construction of so-called alternative forecasts, with consideration of the effects of new factors or elimination of formerly existing ones that have a negative effect on a given population. This is a means of assessing the possibilities and efficacy of prevention of malignant tumors. Investigation of epidemiology of preneoplastic diseases and patterns of detection of tumors through preventive examinations is also referable to the realm of epidemiological studies.

Distinction of high-risk groups plays a large part in implementing measures for cancer prevention. The high-risk groups are those contingents of the population among whom, by virtue of a number of exogenous and endogenous factors existing against a background of preneoplastic diseases, the danger of onset and development of tumors is greater than in other population groups that are not exposed to these factors. The presence of many risk factors creates certain difficulties in assessing their combined effect on the body, methods of screening for "risk groups" and practical use thereof. It is not wise to form "high-risk groups" according to existence of at least one factor, since with such a screening method, the high-risk group would include up to 70% of those examined. At the present time, formation of "risk groups" according to different syndromes of signs and by means of multifactor evaluation of different combinations of risk factors is the most effective. The practical value of this method has been demonstrated by numerous epidemiological studies pursued in the USSR and abroad.

The organizational principles of detecting "high-risk groups" include epidemiological studies to determine factors contributing to disease, development of screening charts listing risk factors, gathering information by means of these charts among the public, dispensary supervision of a selected group using methods of special-purpose early diagnosis. The actual procedure for singling out the "risk groups" includes mass scale screening of the public using a set of "solving rules," which make use of signs of the questionnaire type that are obtained from epidemiological studies. As a result of this phase, the range of individuals subject to further examination is significantly reduced, and these individuals can be examined with the use of another category of "solving rules," which are based on the results of clinical studies.

N. N. Petrov and A. I. Serebrov made a great contribution to development of cancer prevention; they validated the principles of primary prophylaxis, which included detection and treatment of preneoplastic diseases, mass-scale preventive examination of the public and elimination of the effects on man of

carcinogens. The study of carcinogenic compounds played a large part (L. M. Shabad).

The next stage in development of prevention was the teaching on modifying factors (P. A. Bogovskiy) and development of research on epidemiology of malignant tumors (N. N. Blokhin, V. V. Dvoyrin, V. B. Smulevich, L. I. Charkviani, N. I. Kolycheva, S. N. Nugmanov, K. L. Bazikyan and others)--the theoretical foundation for validating and implementing cancer prevention measures.

The results of studies of epidemiologists concerned with noninfectious diseases indicate that a multidisciplinary approach is required in this work, both at the stage of organizing research and the stage of introduction to practice. After all, we are usually dealing with measures not only against cancer, but against other chronic diseases. And this means that it is imperative to work out programs of combined prevention of chronic noninfectious diseases.

We consider the following to be the principal tasks for epidemiology of malignant tumors for development of cancer prevention: continued in-depth investigation of the incidence of malignant tumors with consideration of their morphological forms and localization in different age-sex, social, occupational ethnic and other population groups in different administrative, economic-geographic, environment-climate territories of our country; singling out the population groups and regions where highest and lowest incidences of malignant neoplasms are noted; demonstration of endogenous and exogenous factors that are instrumental in or prevent the spread of malignant tumors and preneoplastic diseases; choice of the most informative sources for evaluation of distinctions of distribution of malignant tumors and determination of comparability of indicators to make a comparative study in both the USSR and in comparing data for different regions of the USSR to those of other countries; further development of statistical methods of assessing reliability of indicators; demonstration of clustering effect (clustering of cases of disease), further development of record-keeping system and implementation of the necessary organizational measures in areas chosen for in-depth investigation; further upgrading of the cartographic method of investigation with use of computer cartography and upgrading its effectiveness in the study of epidemiology of malignant tumors.

The oncogeographic approach will enable us to obtain the time and space pattern of distribution of the main forms of malignant tumors and disclose the link between environmental factors and morbidity rate. The many indicators characterizing the environment-tumor system raise the question of searching for new methods of studying links. And this is one more means of checking hypotheses about the origin of tumors and elaborating programs to prevent them. It is important to make broader use of diagnostic methods of mass examinations for epidemiological studies (immunological tests, cytological method, fluorography, mammography and others).

It is of great interest to study malignant tumors among small ethnic groups living in the Extreme North, Far East and Extreme South, as well as to compare them. This is particularly important because the existence of regional pathology of tumors (esophageal cancer and others) requires special investigation with the use of population genetics methods.

Investigation of cohorts born in specific years, observation of morbidity and mortality referable to cancer when they reach a certain age offers additional opportunities for working out forecasts of levels of morbidity and mortality among the population.

One must pay special attention to regions with extremely low morbidity and mortality referable to malignant tumors. Standardization according to sex and age, as well as checking quality and fullness of records, rules out estimating mistakes. If the indicators remain low, as before, after this, it would confirm the hypothesis that there are regions where the effect of adverse environmental factors is minimal. These models are extremely important to validation of regional prevention of malignant tumors.

As before, the question of correlation between age and cancer is of great scientific interest. Morbidity peaks are referable to different age groups in different population groups. The conditions for normal longevity apparently prevent tumors, but this matter has been virtually unstudied.

Generalization of the experience of epidemiological studies and elaboration of the optimum program and general principles of implementation thereof at all stages must be taken into consideration when integrated with other representatives of epidemiology of noninfectious diseases (cardiologists and others).

The experience gained from 26 cooperative retrospective studies, with the use of computers, indicates that there is a need for further refinement of methods of assessing the role of different factors and selecting those of greatest significance to distinguishing high-risk groups.

The question of ways and means of introducing the results of epidemiological studies to practice is an urgent one, and it requires elaboration of concrete programs for the main localizations, concurrent development and implementation of measures to eliminate or attenuate to the utmost extent the effects of adverse factors, develop conditions that prevent onset of malignant neoplasms. This includes both general social and occupational-technical measures, as well as upgrading public health services in order to make early detection of cancer cases and individuals with so-called precancer diseases.

The purpose of epidemiological studies also includes upgrading anticancer campaigns, investigation of efficacy of measures to control malignant neoplasms, indicators of which could be not only a decline of morbidity and mortality, but changes in long-term results of treatment, longer patient survival after treatment and rehabilitation.

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COURSE AND OUTCOME OF ACCIDENTAL LASER INJURIES TO FUNDUS OCULI

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[Article by Prof V. V. Volkov, Honored Scientist of RSFSR, L. I. Balashevich and Yu. A. Kirillov, candidates of medical sciences, R. I. Kovach, candidate of physicomathematical sciences, and Prof P. V. Preobrazhenskiy, Leningrad]

[Text] Accidental eye injuries are observed in individuals who come in contact with laser radiation due to the wide use of lasers in various sectors of science and engineering, in spite of existing safety rules. Analysis of the distinctive features of such lesions is of considerable interest, from both the scientific and clinical point of view. It is important to investigate accidental laser injuries in the interests of development of methods of treating them, forecasting work capacity and for further refinement of safety practices. Table 1 systematizes the results of our dynamic observations of visual functions in eight victims of accidental exposure to laser radiation. In seven cases, only one eye was involved and only in one case were both eyes injured. Before trauma, visual functions were optimal in all of these cases.

In addition to these data, we also analyzed reports of 18 analogous laser injuries described in the available literature, which contained rather comprehensive information both about circumstances leading to injury and clinical manifestations thereof (V. P. Zhokhov, P. V. Preobrazhenskiy, A. I. Semenov, 1968; N. L. Malanova, 1968; N. L. Malanova, N. D. Mel'nikova, 1969; V. Kh. Markaryan, 1969; G. I. Osipov, M. M. Pyatin, 1978; P. I. Saprykin, 1978; Blancard, Sorato, Blonk et al., 1964; Rathkey, 1965; Zweng, 1967; Curtin, Boyden, 1968; Apollonio, Righi, 1970; Coscus, 1974; Hant, Bernard, Zimon et al., 1974; Henkes, Zuidema, 1975; Decker, 1977; Whitney, 1977). There are also reports of other accidental laser injuries to the eyes (about 30) which, however, do not contain the above information (Dulberger, 1962; Van Beuningen, 1975, and others).

Our analysis revealed that most (about 80%) of such injuries occurred in the course of operating laser units in scientific laboratories. The eye had been exposed to both a mirror-reflected (52%) and direct (48%) beam.

Accidental exposure, which was unexpected to the victims who usually did not fix their eyes on the source of radiation, most often caused injuries localized to one side of the fovea, but at a short distance from it (a lesion in the



fovea proper was observed in 48% of the cases, whereas the localization was parafoveal in the others).

It should be stressed that the localization of the focus of tissular injury in the fundus of the eye has a considerable influence on severity of eye damage, as noted in the classification of eye burns of V. V. Volkov (1972). Thus, when the injury is localized on the periphery of the fundus, it remains unnoticed by the victim in most cases and can be detected only by a special examination of the visual field and thorough ophthalmoscopy. However, an injury that involves the fovea and parafoveal region leads to immediate and drastic reduction of central vision, due to the distinctions of distribution of cones on the surface of the retina.

As a rule the fovea was injured by a direct beam with a rather considerable amount of energy penetrating into the eye. In such cases, it was not uncommon to find local destruction of tissue of the retina and vascular tunic. Parafoveal injuries caused most often by a mirror-reflected beam differed in that there was somewhat less extensive destruction of fundal tissues. Although the injuries to the eyegrounds involved a small area, in some cases their adverse effect on vision increased due to diverse forms of hemorrhages (subretinal, retinal, preretinal and, particularly, vitreal).

In some cases, openings appeared in the retina in the region of the injury. Lack of subsequent separation thereof in such cases was apparently attributable to concurrent formation of rather firm chorioretinal adhesions along the edges of such orifices.

Because of the above-mentioned distinctions (localization, degree and area of destroyed tissues), most of the accidental injuries to eyes by lasers were rather serious. In 78% of the cases, there was drastic reduction of central visual acuity and development of central and paracentral scotomas differing in size (from 23' to 10°), which some victims perceived as dark or colored spots differing in intensity.

The clinical signs of accidental injuries to the eyegrounds by laser beams were indicative of the fact that duration of the laser pulse had an appreciable effect on their severity: injuries caused by very short nanosecond-range pulses, unlike those in the millisecond range, were usually more serious, associated with hemorrhages and ruptures in tissues of the fundus; injuries caused by pulses in the millisecond range were essentially in the nature of coagulation and were more limited in area. All these data are consistent with existing conceptions of dependence of the mechanisms of deleterious effects of a laser beam on eye tissues on its energy and time parameters.

The course and outcome of accidental injuries to eyegrounds by a laser beam depended on the nature of the lesion (depth and extensiveness of injury to the retina and vascular tunic, presence of hemorrhages and breaks in tissues) and its localization. Gradually, particularly when appropriate therapy is instituted, the injuries healed and this was associated with resorption of edema, redistribution of pigment and formation of a typical chorioretinal cicatrix at the site of injury. The healing process and restoration of visual functions were appreciably delayed in the presence of hemorrhages. However,



ultimately 41% of the 27 cases discussed regained virtually complete vision (to 1.0), usually with reduction or disappearance of scotoma, within different periods of time (ranging from several days to several months).

In victims with an atrophic chorioretinal focus in the region of the fovea (92% of the cases), vision was not entirely restored (remaining in the range of 0.1-0.3), and scotoma persisted (1 to 10°). The improvement in acuity of vision, which occurred as time passed with parafoveal localization of injury (to 0.4-1.0) could be attributed to the fact that, with such exposure, the reduction in foveal functions was due to functional (temporary), rather than structural, disturbances in the fovea. The functional disturbances could have occurred as a result of commotio, edema, hemorrhages and other processes that developed in the retina around the parafoveal focus of injury and extending for some time to the region of the fovea. Moreover, true regeneration of injured light-sensitive elements and shifting of adjacent intact ones to the region of the focus could have been significant to recovery of visual functions.

These data indicate that there is most often immediate and drastic decline of vision in cases of accidental injuries to the eyegrounds by a laser beam. Such victims require hospital treatment for 1-2 months. Therapy must be combined and include the following: anti-inflammation and desensitizing therapy (corticosteroids, dimedrol, pyrogenal according to schedule, etc.); resorption therapy of hemorrhages (osmotherapy--intravenous infusion of 10% calcium chloride, 10% sodium chloride, 40% glucose solution; enzyme therapy--papain, terrilitin in drop form, subconjunctival injections, by means of phonophoresis, fibrinolysin and others); vasodilating and vascular-wall strengthening agents (no-shpa, nicotinic acid, rutin, stugeron, prodektin and others); products that improve trophics (vitamins, tissue preparations, ATP, glutamic acid and others).\*

Out of the 21 cases associated with injury to the fundus oculi and diminished vision to 0.3 or less, vision was restored to normal in 29%, to 0.4-0.5 in 9%, whereas it remained persistently low in 62% of the cases. This indicates that laser injuries to the fundus could have a substantial influence on future work capacity (particularly when the level of energy penetrating into the eye is significant, the focus is localized in the fovea and there is injury to both eyes). At the same time, it should be noted that in such cases, only one eye is affected almost always. In view of this, as well as of the possibility of substantial improvement of vision in the injured eye in one-third of the cases after treatment, there are no grounds to include accidental laser injuries in the category of inevitably disabling conditions.

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\*L. A. Linnik et al. (1978) suggest the use of ruby laser radiation for treatment of laser trauma to tissues of the fundus oculi (in order to produce a coagulation barrier, resorption of hemorrhages in the vitreous body and stimulate visual functions).

Table 1. Visual functions in the presence of accidental injuries to fundus of the eye by laser radiation differing in parameters

Case No	Victim	Laser radiation parameters			Localization of injury in fundus	Acuity of vision*		Visual field (numerator--before treatment, denominator--after treatment)
		Wave length, $\mu\text{m}$	pulse duration	energy in eye, mJ		before treatment	after treatment	
Exposure to direct beam								
1	G.	1.06	10 ns	3.0	Fovea	0.1 (1 day)	0.3 (1 month)	Absolute central scotoma 5° no change
2	S.	0.69	300 $\mu\text{s}$	200.0	Parafovea	0.2 (1 day)	1.0 (10 days)	Absol. central scotoma 2-3° disappeared in 10 days
3**	N.	"	25 ns	30.0	Fovea	0.2 (1.5 yrs)	0.2 (10 days)	Absol. central scotoma 10° no change
4**	P.***	"	25 ns	3.0	Fovea	0.1 (1 day)	0.1 (3 months)	Absol. centr. scotoma 8-10° no change
		"	25 ns	0.05	Parafovea	0.6 (1 day)	1.0 (3 months)	Absol. paracentral scotoma no change
		Exposure to mirror-reflected beam						
5	M.	0.69	80 ns	3.0	Parafovea	0.2 (8 h)	0.8 (2 months)	Absol. paracentr. scot. 4° Barely demonstrable relative paracentr. scotoma
6	K.	1.06	30 ns	>3.0	Parafovea	0.1 (1 day)	0.5 (14 days)	Absol. paracentr. (4-5°) and relative central (8-10°) scotoma. Relative scotoma reduced to 6-8° after 14 days
7	D.	1.06	50 ns	5.0	Fovea	0.2 (2 days)	0.3 (16 days)	Absol. central scotoma 3° reduced to 1°
8	Z.	1.06	80 ns	20.0	Paramacula	0.5 (1 day)	1.0 (1 month)	Absol. paracentr. scot. 3-4° no change

\*Time of examination (from moment of exposure) given in parentheses.

\*\*Case of V. M. Gayday and V. I. Filippenko.

\*\*\*Both eyes injured.

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DEVELOPMENT OF RESEARCH ON OCCUPATIONAL PATHOLOGY AT MOSCOW SCIENTIFIC  
RESEARCH INSTITUTE OF HYGIENE IMENI F. F. ERISMAN

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 7, Jul 81  
(manuscript received 19 Feb 81) pp 36-39

[Article by A. A. Komarova (Moscow), Institute of Hygiene imeni F. F. Erisman]

[Text] One of the most important tasks put to Soviet occupational pathologists is to eradicate occupational diseases in our country. Performance of this task depends entirely on solving a number of special problems which include, along with introduction of appropriate engineering-technological and sanitary-hygienic measures into industry, organization of scientifically validated professional screening of individuals allowed to work under conditions of exposure to some deleterious industrial environmental factors or other, refinement of methodological procedures and methods suitable for detection of the earliest pathological changes in man that develop under the influence of deleterious industrial factors, elaboration of criteria for assessing compensatory and adaptive mechanisms in workers, criteria for estimating the physiological norm and pathology on the basis of modern physiological, biochemical, immunological, radioisotope and other methods with use of functional load tests, validation and direct introduction into industry of such ameliorative measures as therapeutic diet, preventive drugs, physical culture, etc., as well as development of pathogenetically substantiated and tested methods of treatment and rehabilitation of patients with occupational diseases.

While we do not have the opportunity to shed comprehensive light on all aspects of the problem we have raised in this article, we shall merely discuss some of its aspects, the most relevant ones in our opinion, which are being solved in the course of the scientific research being conducted in the clinical department of MNIIG [Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman], which is a head institute of the RSFSR Ministry of Health.

One of the basic directions of scientific research in the clinical department of this institute is the combined and comprehensive study of distinctions of effects on man of various deleterious physical and chemical factors in the industrial environment, including general vibration, high-frequency noise, ultrasound, magnetic fields, laser radiation, polymers, etc.

Thus, as a result of a survey of a large group of workers (more than 15,000) employed in occupations with a vibration hazard (concrete workers in the

building industry, excavator operators, workers in the mining industry and others), occupational pathologists developed, for the first time, problems of symptomatology and classification of the cerebral form of vibration sickness; they have studied the pathogenesis, proposed and tested under clinical conditions pathogenetically validated methods of treating various forms of vibration pathology, determined the patterns of the recovery process as it relates to vibration sickness and proposed appropriate criteria for forecasting rehabilitation measures. It was proven that prompt, structured employment of patients with vibration sickness at the early stages of the disease assures complete medical and occupational rehabilitation. These studies made it possible to develop and introduce specific therapeutic, health-improving and rehabilitation measures, which have led to a considerable decline of incidence of the cerebral form of vibration sickness, eradication of pronounced forms of this disease and, consequently, a substantial decline of disability rate.

The institute's occupational pathologists have also been the first to describe the clinical distinctions of a unique form of vasovegetative polyneuritis, which develops under the influence of intermittent heterogeneous magnetic fields, and encephalovegetopolyneuritis, which is caused by low-frequency ultrasound. Adoption by enterprises of scientifically substantiated therapeutic and preventive measures, which were developed in the clinical department of the institute, resulted in a substantial improvement of working conditions and decline of morbidity among the relevant worker groups. Thus, in the last few years, there have been no new recorded cases of ultrasound pathology and a decrease to one-half in number of individuals with the asthenovegetative syndrome among workers in the range of magnetic fields.

Comprehensive and in-depth medical examination of workers employed in specific sectors of the national economy is the basic element that enables occupational pathologists to work out scientifically validated additions to the list of medical contraindications for employment in places where working conditions are deleterious, as well as to substantiate methodological approaches to occupational screening of certain groups of workers.

Thus, under the 10th Five-Year Plan, the institute's occupational pathologists developed an original method for professional screening of workers who are allowed to work in noisy plants, which is based on both consideration of typological distinctions of their nervous system and evaluation of the nature of the earliest reactions to excessive noise on the part of the auditory analyzer and cardiovascular system of those who are employed. Experimental studies have proven that the body's reactions to noise in the nervous and emotional sphere, auditory analyzer, cardiovascular system depend on the physiological distinctions of the nervous system and they determine individual tolerance of noise. Moreover, it was found that analysis of the results of dynamic studies of hearing was the most productive, rather than examination of adaptation to noise, for detecting individuals with heightened sensitivity to noise.

It is particularly important to solve problems of professional screening and vocational guidance for adolescents enrolling in educational establishments in the professional and technical education network. It has been proven that

the adolescent body is more sensitive to noise than that of adult workers, and that changes can develop in hearing functions of adolescents even at noise levels that do not exceed the established standard parameters.

In view of the fact that, as a rule, therapeutic and health-improving measures are the most effective at the early stages of occupational diseases, particularly upon detection of the very earliest premorbid signs of disturbances in body function, the staff of the clinical department devoted much attention in their research to development, refinement and introduction to occupational pathology practice of new modern and informative diagnostic methods.

In the last decade alone, methodological recommendations were prepared on the use of clinicobiochemical and electrophysiological methods of assessing the effects of dithiocarbamates, clinical-electrophysiological examination of central nervous system function during exposure of workers to physical industrial factors, use of clinical instrumentation methods of detecting early signs of changes in the stomach under the effect of physical factors, testing reactivity of the adrenosympathetic system and central nervous system to assess the effects of some physical factors in the industrial environment, recognition of early signs of pulmonary hypertension in patients with chronic dust-related bronchitis by means of rheography and on the use of electrokymography for diagnosing and evaluating the results of treating patients with dust-caused bronchitis and pneumoconiosis.

A set of the most informative biochemical methods was developed for detection of early signs of effects of chemicals on the liver, on the basis of many years of observations of the health status of a large group of workers in the chemical industry who were exposed to such little-studied chemical compounds as carbamide resins, sebacic and adipinic acid, etc. It was determined that biochemical and immunohematological tests can be used to evaluate immunobiological reactivity of workers. It was also found that immunological tests can be used as distinctive tests of physical condition of workers in the chemical industry which permit, on the one hand, detection of inapparent forms of poisoning with minimal symptoms and, on the other hand, determination of efficacy of health-improving measures implemented in the relevant industries.

In solving concrete problems of improving health-related working conditions, the clinicians of MNIIG take into consideration the condition of the workers' compensatory and adaptive reactions. Many years of investigation of the incidence and distinctions in the course of dust-related pathology of the lungs in coalminers in different parts of the RSFSR showed that they were related to both the qualitative and quantitative composition of dust, as well as nature of the workers' reactions to deleterious industrial factors and specific climate conditions.

Combined clinicophysiological and immunobiological studies of coalminers in the Arctic, coal basin near Moscow and East Donetsk Basin revealed changes in respiratory organs, red blood cells, adrenosympathetic system and proteinograms, which were indicative of development of adaptive reactions that, of course, influence development and course of occupational diseases. Consequently, when implementing ameliorative measures one must pay attention to enhancing systemic resistance of miners working in different coal mines.

On the basis of combined and comprehensive medical examination of a large group of people working with laser units in the watch-making and radioelectronic industries, at Glavabrazivalmaz [Main Administration of Abrasive and Diamond Industry] enterprises, it was determined that functional health disorders were not limited to the eyes, but also affect the nervous, cardiovascular systems and are manifested by changes in parameters of peripheral blood, biochemical indicators of metabolic processes, etc. According to the nature of the functional changes found in people working with lasers, they are based on neurodynamic disorders in activity of higher regulatory centers responsible for maintaining homeostasis. In the case of prolonged chronic exposure of man to scattered laser radiation, there can be a disruption of compensatory and adaptive mechanisms with subsequent development of pathology. Hence, the therapeutic and health-improving measures worked out by clinicians for pertinent groups of workers are quite justified; they take into consideration the need to enhance man's nonspecific resistance, and use of drugs in the adaptogen group.

Elaboration of pathogenetically determined and scientifically validated symptomatic therapy is of substantial importance to medical rehabilitation of patients with occupational diseases. In the clinical department of MNIIG, therapeutic complexes have been developed and tested, which include drug, balneological and physiotherapy for patients with chronic dust-caused bronchitis, with due consideration of the form, stage and distinctions of course of the disease, presence or absence of complications, as well as for patients with various forms of vibration sickness, ultrasound pathology and functional disorders of digestive organs in the chemical industry; a method has been developed of ultrasound therapy, which is used in the combined therapy of patients with chronic dust-caused bronchitis.

In addition to the traditional directions of research done by occupational pathologists--investigation of the effects of physical and chemical industrial factors on workers, development of new methods of early detection and treatment of occupational diseases, etc., increasing attention is being given by the clinical department of MNIIG to such an extremely important and pressing problem as the effects of factors in the industrial environment on onset and course of general diseases, in order to safeguard the health of industrial workers. It has been proven that such industrial factors as vibration, noise, etc., are instrumental in more frequent development and more serious course of cardiovascular diseases.

In this respect, the effects of vibration and noise on development of cerebral atherosclerosis, its epidemiology, symptomatology and course merit special attention, for this is important to prevention of development of this disease at a relatively young age, since the occupational pathologists at the institute obtained data indicating that vibration and noise are instrumental in development of the atherosclerotic process at an earlier time and in a more marked form.

Thus, although extensive implementation of health-improving measures and the substantial re-equipment of industry in our country have led to considerable decline of occupational morbidity and eradication of marked forms of occupational diseases at the present time, in modern industry workers may experience the



effects of deleterious industrial factors of low intensity and in complex combinations. This, in turn, could affect development and persistence of both occupational and general diseases. For this reason, the concerted efforts of occupational pathologists are needed in order to further improve and define the therapeutic and health-improving measures that are being developed for the purpose of further lowering of the incidence of occupational diseases in our country.

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## DIAGNOSIS BY TELEPHONE

Tallinn SOVETSKAYA ESTONIYA in Russian 5 Aug 82 p 2

[Article by Sh. Semenov, Riga]

[Text] Even a highly experienced physician cannot distinguish an electrocardiogram obtained at a patient's bedside from its copy received by telephone. Such qualitative identity is provided by the Riga Polytechnical Institute's long-distance transmitter of multichannel telecommunications. The main advantage of this innovation over existing units of similar purpose is its resistance to interferences, which virtually eliminates distortions. A miniature adaptor is attached to a standard electrocardiograph and connected to the telephone network. A curve of the bioelectric signal will be accurately reproduced by an automatic recorder at the other end of the line regardless of the distance to the receiving apparatus. If necessary, the signal can be sent simultaneously to a computer for data analysis.

Transmission can be performed either by telephone or by radio, for example from the back of an ambulance. The medical stations at several large institutions in Riga have been equipped with the new adaptor, making possible prompt consultation in emergency situations with the republic cardiological center. Scientists at the Riga Polytechnical Institute are now developing an even more refined apparatus, which will transmit by telephone channels or by radio not only electrocardiograms but also encephalograms--recordings of bioelectrical impulses in the brain.

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CSO: 1840/446-A

USE OF HEMOSORPTION IN COMPREHENSIVE TREATMENT OF PATIENTS WITH SEVERE BURN DISEASES

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 4, Apr 82 (manuscript received 18 Jan 82) pp 49-52

ASTAPENKO, V. G., BULAY, P. I., KIRKOVSKIY, V. V., OSTAPENKO, V. A. and NIKOLAYCHIK, V. V., Belorussian Republic Center for Hemo- and Lymphosorption; Belorussian Republic Burn Center

[Abstract] Successes in surgical treatment of burns are being increased by new applications of extracorporeal detoxication methods. Clinical use of hemosorption has contributed as a non-specific detoxication procedure for various endogenic infections. Burn toxemia is related to formation of biologically active peptides resulting from protein disintegration at the burn site. Resorbed into the blood, these peptides cause serious damage to blood vessel tone and the permeability of cytoplasmatic and basal membranes. The Center for Hemo- and Lymphosorption had demonstrated the presence of so-called coverage molecular weight oligopeptides (SMO) in the blood of patients with a "syndrome of endogenous intoxication." Use of hemosorption with patients suffering endogenous intoxication syndrome in the presence of burn disease lowered total esterase activity of the blood, and SMO level. Access to the blood system was by an arteriovascular bypass located according to the particular burn site. Silicon tubes and a mass-exchanger with SKN sorbent operated at 70-100 ml/min. The clinical effect of hemosorption included the return of consciousness, improved feeling and appetite, disappearance of stem symptoms, reduction of rapid breathing and pulse, and other positive changes. Such positive results were registered even when burn severity eventually led to death. Figures 2; references 15 (Russian).  
[394-12131]

## DYNAMICS OF SKIN ELECTRIC RESISTANCE DURING ELECTRICALLY INDUCED SLEEP

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, Apr 82  
(manuscript received 2 Dec 81) pp 89-94

KRAUKLIS, A. A., SPANDEGA, I. A. and SLDERSONS, A. A., Latvian Scientific Research Institute for Experimental and Clinical Medicine, LaSSR Ministry of Health

[Abstract] The authors' previous study of the therapeutic effects of electrically induced sleep showed that skin electric resistance (SER) was a simple and dependable indicator as an objective index of functional state. The authors studied skin electric resistance dynamics in 328 patients with gastrointestinal disorders, cardiovascular or central nervous system disorders. "Electrosleep" was induced daily with the Elektroson 4T apparatus. During electrosleep, skin electric resistance was measured in symmetrical skin zones at constant voltage. Healthy subjects showed gradual increase of SER at the palms and foot soles, gradual decrease in all other body zones, and uncertain fluctuations at the forehead and all over the face. When all patients tested were divided according to laterality, the authors noted a connection between left-handedness and left vision in patients and those with right dominance, in that, during sleep, there were opposite asymmetrical tendencies in SER. The positive effects of electrosleep were confirmed by the appearance of regular SER dynamics in symmetrical body zones, gradual increases of asymmetry in those zones, and rapid normalization of absolute SER values after physical or psychoemotional stress. The procedure does not require complex apparatus or large amounts of time. Figures 6; references 10: 7 Russian, 3 Western.  
[395-12131]

## TREATING LIMITED BURNS IN LOCAL ISOLATION CHAMBERS WITH CONTROLLED ATMOSPHERE

Baku AZERBAYDZHANSKIY MEDITSINSKIY ZHURNAL in Russian No 3, Mar 82 pp 20-24

GASANOV, T. M., All-Union Burn Center, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences

[Abstract] Burn treatment must necessarily include removal of dead tissue, prevention of secondary complications and avoidance of infections which could be contracted in the hospital. The title institute has developed a total apparatus for ventilating, controlling pressure, temperature and humidity, and monitoring patients during and after treatment. The patients treated in this study were in 3 groups: those with II-III degree surface burns, with fresh III-IV degree deep burns, and, with deep, infected III-IV degree burns. The burns of the first group (27 patients) were cleaned, treated with an alcohol-iodine solution on healthy tissue and then the injured extremity was placed

in the isolation chamber. The second group (7 patients) received similar treatment, while the more serious third group (14 patients) required a more passive preparation before isolation. Results indicated that the treatment procedure was simple and effective, reducing total confinement time, and cutting microorganism count significantly. For circular burns of the extremities, prevention of lysis and rejection of autotransplantations requires the compression-distraction apparatus of Kaliberz and Ilizarov. Figures 3, references 3: 2 Russian, 1 English.  
[396-12131]

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CEREBRAL AND SOMATIC DISORDERS AMONG ALCOHOLICS (CLINICAL AND ANATOMIC STUDY)

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, No 7, Jul 82 (manuscript received 3 Dec 81) pp 94-99

SAVEL'YEV, Yu. M and DINERSHTEYN, L. V., Moscow Municipal Psychiatric  
Clinic No 4 imeni P. B. Ganushkin

[Abstract] A detailed clinical and morphological examination of 33 chronic alcoholics has been reported. Acute and chronic damage of the nervous system and internal organs was noted clinically. Macroscopic examinations showed lung and brain edema, damage of blood circulation in brain and in the internal organs, fibrous and sclerotic changes in vasculature and pneumonia. Histological analysis showed many reversible and irreversible changes. Cerebral pathology showed acute and chronic alcoholic encephalopathy which was concurrent with all chronic cases. Thus, alcoholism is a polymorphous, polysystemic disease involving the nervous system and internal organs. The lethal outcome is due to brain, cardiac and pulmonary decompensation. Therefore, in treating alcoholics, it is necessary to improve their blood circulation, to stop hemorrhages, to improve activity of the heart and to normalize the functions of lungs, liver and kidneys. References 13: 10 Russian, 3 Western.  
[455-7813]

## MICROBIOLOGY

UDC 579.852.13:579.222:577.152.311]:615.373.012.6

### BIOCHEMICAL AND IMMUNOLOGICAL ASPECTS OF PHOSPHOLIPASE C FROM CLOSTRIDIUM PERFRINGENS

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 82 (manuscript received 18 Feb 81)  
pp 15-22

SHEMANOVA, G. F. and PANTELEYEV, E. I., Moscow

[Abstract] Type A of the title phospholipase is an anatoxin used in preventing gas gangrene. The authors review recent interest in type C. Type A, an anaerobic potential cause of gas gangrene and intestinal ailments, has been developed into a vaccine for the former. Physicochemical properties of phospholipase C (PLC) are summarized. It was obtained by concentration of culture protein using ammonium sulfate; recently, affine chromatography has facilitated higher yields. Molecular heterogeneity and isoenzymes were first described in 1956. Data led to the hypothesis that PLC is synthesized in microbe cells as a structural fragment, followed by antibody center generation. Consequently, PLC has been used as the basis for gas gangrene prophylaxis by rendering its alpha-toxin safe with formaldehyde and heat. Immunogenic properties have been studied using guinea pigs, but replication has been poor. Tests with white mice indicated that shortcomings of the purification process were responsible for the varying results obtained with the alpha-toxin. More recent Soviet tests on human patients have given positive results. PLC has also been used effectively to study immunogenic aspects of gas gangrene research, particularly in relation to inbred characteristics of test mice. A distinct feature of the antigens is their thymus dependency. A polymer variant of the anatoxin led to production of more antitoxins. A goal for future development is the attainment of molecular homogeneity. References 67: 24 Russian, 43 Western. [399-12131]

## FORMATION OF STABLE Hfr-STRAINS DURING INTEGRATION OF R-FACTOR RPI WITH E. COLI K 12 recA CHROMOSOME AND THEIR USE IN SELECTION OF R'-PLASMIDS

Moscow ANTIBIOTIKI in Russian Vol 27, No 2, Feb 82 (manuscript received 8 Sep 81)  
pp 121-125

VOLOZHANTSEV, N. V., STEPANSHIN, Yu. G. and DANILEVICH, V. N., All-Union  
Scientific Research Institute of Applied Microbiology, Serpukhov, Moscow Oblast

[Abstract] Plasmids of the P-1 group of incompatibility (RP plasmids) are very special among the plasmids of gram negative microorganisms. Their unique ability to replicate in a wide spectrum of bacterial hosts makes them suitable vectors for in vivo cloning of genetic information. The goal of the present study was to investigate the properties of stable Hfr strains formed during integration of RPI with the chromosome of E. coli recA. In particular, three subclones of the N type thermoindpendent derivatives (VS19, VS31 and VS32) were studied. In contrast to the principal mass of thermoindpendent derivatives JC 1553 (pVD1), these subclones transmit with a low frequency plasmid markers upon crossing with recipient bacteria E. coli C600; they had no extrachromosomal DNA even after prolonged cultivation. They also showed properties due to the plasmid pVD1; they are stable to ampicillin, kanamycin and tetracyclin, but sensitive to P-specific phage PRR1. It was concluded that these VS bacteria carried the plasmid pVD1 stably integrated with bacterial chromosome, therefore they appeared to be of the Hfr strain. Further studies of these Hfr bacteria indicated that they could be utilized to produce plasmido-chromosome hybrids carrying chromosome fragments of different length. They retained all properties of the plasmid and were quite stable. References 8: 5 Russian, 3 Western.  
[410-7813]

## PHARMACOLOGY

### SPECIFICITY OF TETRODOTOXIN EFFECT ON MOLUSC NEURONES

Moscow BIOFIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 21 Jun 81) pp 738-739

CHEMERIS, N. K., Institute of Biological Physics, USSR Academy of Sciences, Pushchino (Moscow Oblast)

[Abstract] In an attempt to answer the question whether the receptor of tetrodotoxin (TTX) is a component of the weakly sensitive sodium channel structures or whether it acts nonspecifically, experiments on dialysed mollusc membranes of *Limnaea stagnalis* were carried out using the voltage clamp method. TTX led to a drop in sodium current at all neurons isolated after proteolytic treatment. At the highest concentration, TTX showed no effect on the time or potential functions of the current. The TTX effect developed in 1-2 minutes and was reversible. In the dose-response experiment a theoretical curve plotted on the assumption that one molecule of TTX blocks one channel was superimposable with the experimental curve, supporting the concept of a specific action of the blocking agent. At pH 10 and a concentration of 30  $\mu\text{M}$ , TTX exhibited an effect analogous to one obtained with a 3  $\mu\text{M}$  concentration and pH 7.5. In general, the specificity of TTX was the same on both highly and weakly sensitive objects. Hence it was concluded that TTX receptor is a component part of the structures of weakly sensitive sodium channels. Figure 1; references 11: 1 Russian, 10 Western (2 by Russian authors). [433-7813]



## PHYSIOLOGY

UDC 612.821.83+612.84

### CHANGES IN FUNCTIONAL STATE OF NEOCORTEX DURING DIRECT ACTION OF OPTICAL RADIATION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOVA in Russian  
Vol 68, No 7, Jul 82 (manuscript received 17 Apr 81) pp 999-1005

VELLING, V. A., GAL'DINOV, G. V. and GROMOVA, S. A., Physiological Division  
imeni I. P. Pavlov, Scientific Research Institute of Experimental Medicine,  
USSR Academy of Medical Sciences, Leningrad

[Abstract] The aim of the present study was to explore possible application of photobiological technology in neurophysiological studies, specifically the regulation of the functional activity of brain structures by direct action of optical radiation. The functional state of the brain was experimentally evaluated on cats and rabbits by means of spontaneous EEG and by epileptiform activity. Experimental data showed that direct irradiation with a weak optical source of a visible region showed no effect on the functional state of the animal brain. Stronger action resulted in an effect on the irradiated brain segments evidently due to thermal damage of the nervous tissue. In contrast, the effect of UV irradiation developed slowly but was maintained even after irradiation. In this case the thermal factor was noncontributory. A tentative mechanism of action was proposed based on alteration of the neuron membrane permeability to Na and K ions followed by depolarization of membranes. The action of visible light results in irreversible heat damage of the neurons, suppression of their activity and a decreased EEG amplitude. Figures 4; references 20: 15 Russian, 5 Western.  
[457-7813]

## RELIABILITY OF ENZYMIC SYSTEMS AND MOLECULAR MECHANISMS OF AGING

Moscow BIOFIZIKA in Russian Vol 27, No 4, Jul-Aug 82 (manuscript received 4 Nov 81) pp 614-617

KOL'TOVER, V. K., Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka (Moscow Oblast')

[Abstract] A probability model of aging was proposed based on the concept of "biological clock". An assumption was made that a pool of such "clock cells" contains various types of functional elements whose effectiveness determines the biological age of an individual. Gene groups may act as such elements. Their functioning is related to the damage which may occur in these genes. Whenever this damage reaches a critical level at which the functional characteristics of the genes drops below the permissible level, the organism dies. This model appeared to fit well the experimental data of gerontology and agreed well with Gompertz law, Strekler-Mildvan's compensation effect, etc. The length of an individual's life depends on functional damage of genome during the initial moment of ontogenesis, on intensity of the stream of  $O_2^-$ , on the mutation load of previous generations, on the effect of radiation, chemical mutagens and other environmental factors. A positive correlation was observed between life span and excess of genes serving as matrixes for the synthesis of mRNA in mammalian brain. The effect of "geroprotectors" on the aging process has been discounted. References 15: 8 Russian (2 by Western authors), 7 Western.  
[433-7813]

UDC 591.18

## ORIENTATIONAL INSTRUMENTAL BEHAVIOR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 265, No 2, Jul 82 (manuscript received 5 Jan 82) pp 497-500

SOLUKHA, B. V., Institute of Zoology, UkSSR Academy of Sciences, Kiev

[Abstract] During the process of orientational behavior, animals exhibit high sensitivity to weak signals. Formation of an instrumental reflex based on components of orientational behavior may lead to determination of maximal capabilities of electroreceptor systems in fish. Orientational instrumental behavior was studied on sheath fish, carps, perch, rainbow trout, steel head trout and on silver salmon. In all cases, as the level of electric or acoustic field was increased, a transition was observed from searching behavior to avoidance of the irritant. In a nonrestrictive aquatarium fish approached the source of the field or departed from it. In an experimental box, a total "freeze" or increased mobility was observed directed at amplification of weak signals or avoidance of the strong field. Amphibians showed a much weaker orientational instrumental behavior than fish. The level of instrumental reaction of groups of animals was higher than that of individual animals.

In case of fish, the increase in mobility during avoidance of strong negative stimuli was proportional to the square root of the number of individuals in the group. Figures 4; references: 3 Russian.  
[412-7813]

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# CHARACTERISTIC DISTRIBUTION OF BIOPOTENTIALS AT ACUPUNCTURE POINTS IN VARIOUS ORGANIC AND FUNCTIONAL DISORDERS OF NERVOUS SYSTEM

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, N 7, Jul 82 (manuscript received 4 Dec 80) pp 87-92

PANCHENKO, Ye. N. and YATSENKO, V. L., Chair of Nerve Diseases, Voroshilovgrad Medical Institute

[Abstract] Electrical potentials of acupuncture points were determined with a B10-1 instrument on 35 patients with organic damage of CNS (infections of vascular and traumatic genesis), 15 patients with various neuroses and 20 healthy controls. The data showed that electrical potentials of the acupuncture points were the same in patients with vascular, traumatic or infectious damage of CNS. Overall, these types of cases showed considerable changes of electric potentials, especially around the area of the head and the face. These changes did not relate to the etiology of a disease as much as to the localization of the damage. The neurotic patients showed much lower elevation of the potentials, lesser variation among various points and lower asymmetry. On this basis it was proposed that this determination could be used as a diagnostic tool differentiating between organic trauma of the brain and various neuroses. Since the acupuncture points of the head showed more pronounced potential changes than those of the torso, it was proposed that these points should be utilized in treatment of CNS diseases. References 4 (Russian).  
[455-7813]

UDC 611.81-012

# MORPHOLOGICAL CHARACTERISTICS OF INDIVIDUAL STRUCTURES OF HUMAN BRAIN

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, No 7, Jul 82 (manuscript received 29 Dec 81) pp 12-14

BOGOLEPOVA, I. N., Institute of the Brain, USSR Academy of Sciences, Moscow

[Abstract] In spite of a number of papers devoted to macroscopic structure of brain hemispheres, characteristics of individual structural organization of the left and right hemispheres have not been reported, especially the organization of cortical and subcortical structures. In the present paper

data are reported on the analysis of 205 brains. Differences between individual brains and between the right and left hemispheres were noted (e.g., in total weight and rostrocaudal length). In addition, structural organization of architectonic formations was studied on logomotor fields 44 and 45. It was shown that individual brains differed by the total volumetric fraction of neurons and glias in III and V cortex fields. Individual variation in structural organization was especially marked by composition of neurons: the content of small, medium and large neurons with different functional loads differed from brain to brain. Figures 2; references 8: 5 Russian, 3 Western. [455-7813]

PUBLIC HEALTH

UDC 613.6:[621.791.927.55+621.791.947.55+621.791.755

LARGE-SCALE IMPLEMENTATION OF PLASMA TECHNOLOGY: IMPACT ON INDUSTRIAL HYGIENE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 8,  
Aug 82 (manuscript received 31 Mar 82) pp 36-38

IL'NITSKAYA, A. V., KALINA, O. V., SINEVA, Ye. L., SHABOLINA, T. A., TSIRKOVA, N.L.  
and POLYNKOVA, A. A., Institute of Hygiene imeni F. F. Erisman, Moscow

[Abstract] The consequences of large-scale implementation of plasma technology on workers' health is briefly surveyed from the point of view of occupational hygiene. The combination of a variety of physical (noise, ultrasound, electromagnetic fluctuations in the visible part of the spectrum, finely dispersed aerosols, noxious gases, highly ionized air) and chemical (aluminum oxides, ozone, nitrogen oxides, etc.) factors and emotional stress serve to initiate a complex of neuropsychiatric and cardiovascular sequelae. References 2 (Russian).  
[11-12172]

## RADIATION BIOLOGY

### FUNDAMENTAL CONTRIBUTION TO RADIATION MEDICINE--RESEARCH ON METABOLISM, BIOLOGICAL EFFECT OF TRANSURANIUM RADIONUCLIDES AND VALIDATION OF STANDARDS

Moscow IZVESTIYA in Russian 17 Aug 82 p 3

[Article by F. Krotkov, Hero of Socialist Labor, academician of the USSR Academy of Medical Sciences, I. Petryanov, Hero of Socialist Labor and academician, L. Il'in, academician of the USSR Academy of Medical Sciences: "Fundamental Contribution to Radiation Medicine--Considered for USSR State Prize"]

[Text] Modern atomic energy, which is based on nuclear electric power plants with thermonuclear reactors, makes use of insignificant amounts of natural uranium. Extensive industrial use of fast breeder reactors makes it possible to make fuller use of the stock of nuclear fuel. Such reactors, which produce plutonium, can provide the needed fuel resources for long-term development of energy.

Prevention of further increase in environmental contamination by the products of combustion of organic fuel (oxides of sulfur, nitrogen, toxic hydrocarbons, heavy metals, ash, etc.) will be an extremely important consequence of wide use of atomic energy and its replacement of traditional sources of energy.

At the same time, the possibility of penetration of various transuranium radioisotopes into the environment and human body, both through air and various food chains that are connected by man have put to medical science the task of investigating the patterns of migration of transuranium elements over various biological channels, patterns of their metabolism in animals and man, distinctions of biological effects and, on this basis, of developing the principles for setting hygienic standards.

A cycle of studies has been submitted for the USSR State Prize: "Basic Research on the Patterns of Metabolism, Biological Effects of Transuranium Radionuclides and Scientific Validation of Standards Thereof," which were conducted by a team of scientists at the "Order of Lenin" Institute of Biophysics, USSR Ministry of Health, under the supervision and with the participation of Prof Yu. Moskalev, Honored Scientist of the RSFSR, and Prof L. Buldakov.

The authors of this cycle of works, who are the founders of Soviet research in the field of radiobiology, toxicology and setting standards for permissible levels of radioactive substances in the human body and environment, are pioneers

in this branch of science. Their research has priority with regard to some directions and is ahead of the work done by scientists in other countries. The results of many years of research made it possible to work out scientifically validated recommendations for permissible levels of transuranium radioisotopes in man, air of industrial buildings and man's natural environment.

These recommendations are based on fundamental studies of the patterns of metabolism of various chemical forms of transuranium elements in different animal species, with different routes and rhythms of intake.

The results of the research done by these authors made it possible to assess the relative biological effectiveness of alpha-emitting radioelements, the risk of development of long-range pathology as related to dosage and to elaborate the principles for setting hygienic standards thereof.

This cycle of studies constitutes a fundamental contribution to the solution of a general biological and medical problem of paramount importance in our time: knowledge about the causes and mechanism of onset of neoplastic diseases, and prevention of their development. The research of this team of authors served as the foundation for a new scientific direction, radiation oncology.

These authors' studies also revealed different forms of radiation pathology, with which the functional cells specific to a given organ are replaced by connective tissue elements, which leads to development of sclerotic processes in them. Experimental models of these forms of pathology are important to the study of pathogenesis of sclerotic processes and refinement of drug therapy for such conditions.

The comprehensive studies of these authors are a major contribution to development of Soviet science, particularly radiobiology and radiation medicine.

The findings of the authors of this cycle of research are well-known both in our country and abroad; they are widely represented in fundamental Soviet and foreign publications dealing with radiation medicine and radiobiology; they have been used to work out Soviet radiation safety standards, recommendations of the International Commission for Radiation Protection, surveys of the UN Scientific Committee on the Effects of Atomic Radiation.

This fundamental work has every justification to claim the USSR State Prize, for both its scientific importance and practical implementation in the area of setting hygienic radiation standards.

10,657  
CSO: 1840/422

## PSYCHIATRY

UDC 616.89-084.3+616.89-036 .1-07

### COMPARATIVE CHARACTERIZATION OF MENTAL DISORDERS AMONG PATIENTS IN REGIONAL POLYCLINICS AND PSYCHONEUROLOGIC PREVENTIVE DISPENSARIES

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
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KOZYREV, V. N. and SMULEVICH, A. B., Main Public Health Administration, Moscow City Executive Committee; Institute of Psychiatry, USSR Academy of Medical Sciences

[Abstract] The differences and similarities of mental disorders seen in several city rayons at regional polyclinics and psychoneurologic preventive dispensaries of Moscow were analyzed. Evaluations carried out at the polyclinics showed that 81.7% of the patient load presented with mental disorders of which the majority were endogenous (schizophrenia and manic-depressive psychoses) and borderline conditions (psychopathy, neuroses, reactive states). The incidence of somatogenic mental disorders at the polyclinics was more than four times greater than at the preventive dispensaries (9.5% vs. 2.1%). On the basis of these observations it appears that special psychiatric services should be established at the general polyclinics to deal with this category of patients. References 20: 10 Russian, 10 Western.  
[454-12172]

UDC 616.895-036.2-07

### DIFFERENTIAL CLINICAL APPROACH TO EPIDEMIOLOGIC DESCRIPTION OF SCHIZOPHRENIC POPULATIONS

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
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SHMAONOVA, L. M. and LIBERMAN, Yu. I., Department of Epidemiology, Institute of Psychiatry, USSR Academy of Sciences, Moscow

[Abstract] A differential approach was taken to an epidemiologic survey of the schizophrenic populations in three Moscow city rayons to obtain meaningful data on the different forms of this disorder. Detailed information for one



rayon showed that the overall morbidity was 9.63/1000 (9.85 for males and 9.48 for females), further subdivided into an incidence of 2.51 for continuously progressive forms, 5.26 for paroxysmally progressive cases, and 1.80 for recurrent cases. Further analysis and comparison of two rayons revealed that the number of hospitalizations per patient (3 and 5.1), duration of individual hospital stays (157.0 and 203.7 days) and the total time of hospitalization during the course of the illness (6.9 and 9.8) varied for the rayons in question. References 20: 13 Russian, 7 Western.  
[454-12172]

UDC 616.89-082:614.881

EMERGENCY ASSISTANCE [SKORAYA POMOSHCH'] WITHIN THE FRAMEWORK OF UNIFIED PSYCHIATRIC SERVICE

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian  
Vol 82, No 8, Aug 82 (manuscript received 15 Oct 81) pp 82-85

KUZNETSOV, M. T. and VOSKRESENSKIY, V. V., Mogilev Oblast Psychiatric Hospital; Medical Emergency Hospital, Mogilev

[Abstract] Description is provided of the services rendered by the special psychiatric emergency team in Mogilev over the last five years. The team consists of psychiatrists who, in addition to transporting patients, provide on-site assistance and serve as consultants to the various city hospitals. The service is administered by the out-patient department of the Psychiatric Hospital. Its general acceptance and recognition is indicated by the increase in the number of calls from 2830 to 1976 to 4103 in 1980. References 13 (Russian).  
[454-12172]

CSO: 1840

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